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STUDIES ON ALKALOIDS FROM *THALICTRUM* SPECIES.III.
OXYDATION OF THALICARPINE AND THALMELATINE

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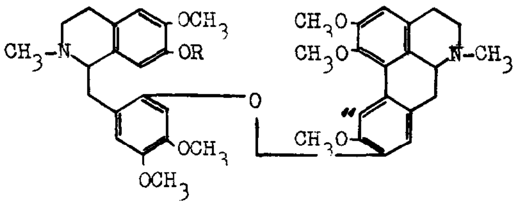
In a recent communication the authors described the isolation of the dimeric aporphine-benzylisoquinoline alkaloids thalicarpine and thalmelatine from *Thalictrum minus* var. *elatum* Jacq.(1). Thalicarpine has previously been isolated from *Thalictrum dasycarpum* Fisch. and Lall(2) and a structure for it has been suggested(3). Lately thalicarpine was also found in *Thalictrum revolutum*(4) and *Hernandia ovigera L.*(5) In the last paper the structure of thalicarpine was corrected to I:

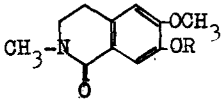


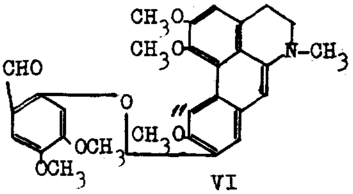
I, R = CH_3
II, R = H
III, R = C_2H_5

As our investigations have shown, thalmelatine /II/ contains a phenolic hydroxyl group and after methylation with diazomethane is converted into thalicarpine(1). The position of the hydroxyl group was established by means of parallel oxydation of thalicarpine and O-ethylthalmelatine /III/ with potassium permanganate in aceton$^{(6)}$. Under these conditions 1-oxo-6,7-dimethoxy-N-methyltetrahydroisoquinoline /IV/ was isolated from the reaction mixture of I, while 1-oxo-6-methoxy-7-ethoxy-N-methyltetrahydroisoquinoline /V/ was isolated from II. Besides these components, one and the same compound /VI/ was isolated, as a main product from both reaction mixtures in the form of yellow needles /EtOH/ with a m.p. of 153-155°. VI represents an optically inactive week base with the formula $C_{29}H_{29}O_7N$, containing five methoxyl groups. /Analysis. Calcd.: C, 69,17; H, 5,81; N, 2,78; OCH_3 30,81. Found: C, 68,92; H, 6,02; N, 2,78; OCH_3, 31,52/. The infrared spectrum of VI contains a carbonyl band at 1680 cm^{-1}. The UV-spectrum shows two maxima: at 268 $m\mu$ /ε = 134 000/ and at 334 $m\mu$ / ε = 52 000/. The last spectrum is indicative of a large conjugated aromatic system. In reaction with 2,4-dinitrophenylhydrazine VI yields a dark-brown precipitate. After hydrogenation in acetic acid according to Adams, VI converts to tetrahydro-VI, consuming two mols of hydrogen. This product was obtained in the form of colorless cristalls with m.p. 187-190°/benzene/. /Analysis. Calcd. for $C_{29}H_{33}O_7N$: C, 68,62; H, 6,55; N, 2,76. Found: C, 68,36; H, 6,76;, N, 2,79/. The infrared spectrum of this compound does not contain a band for carbonyl group, but shows however a dublett for a hydroxyl group at 3585 and 3610 cm^{-1}. Treatment of tetrahydro-VI with sodium-liquid ammonia results in 2,10-dimethoxyaporphine, completely identical with the same compound isolated after reductive cleavage of I with sodium-liquid ammonia /compared melting points of the HJ-salts, chromatographically and with infrared spectra/.

The above mentioned facts allow us to assume the following structure of VI:

IV, R=CH_3
V, R=C_2H_5





VI

This formula is fully confirmed by the NMR-spectrum of VI/in $CDCl_3$/, which contains a signal at 7,01τ for the three protons of a N-methyl group. In comparison with the N-methyl groups of I / at 7,55 and 7,50τ / the absorption is shifted, on account of the influence of the adjacent double bond, to lower frequencies. The two methylene groups absorb at 6,73τ / four protons/. The signals at 6,00 and 6,06τ , each due to six protons, and the signal at 6,25τ , due to three protons, are of five methoxyl groups. Finally the signals at 0,77; 2,56; 2,96; 2,98; 3,47 and 3,58τ are due to seven aromatic protons. The aldehyde group of VI absorbs at -0,36τ .

The place of the double bond in VI is confirmed by the number of aromatic protons in the NMR-spectrum and also by the observed shift of the absorption to much lower field of the proton at position 11 / from 1,72τ of I to 0,77τ of VI/. This shift is due to the already established dependence of the shielding of o-protons in diphenyls on the dihedral angle between the planes of the benzene rings. In the case when the dihedral angle is 0 the frequency shift is the largest. A similar effect is described with dicentrine(7), where the proton in position 11 absorbs at 2,28 τ whilst in dicentrine methine the absorption is shifted to 1,48 τ.

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